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FLOOD INSURANCE STUDY

ORIGINAL

COMPLETED
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CITY OF LELAND GROVE, ILLINOIS

SANGAMON COUNTY

NOVEMBER 16, 1982

Federal Emergency Management Agency

COMMUNITY NUMBER - 170925

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PUBLISHED SEPARATELY:

Flood Insurance Rate Map

FLOOD INSURANCE STUDY

CITY OF LELAND GROVE,
SANGAMON COUNTY, ILLINOIS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Leland Grove, Sangamon County, Illinois, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert the City of Leland Grove to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

This Flood Insurance Study was prepared by compiling pertinent information for the flood hazard areas in the City of Leland Grove from existing technical and/or scientific data originally prepared for other Flood Insurance Studies. This existing data was reviewed by FEMA prior to its use in the development of this Flood Insurance Study to insure compliance with the National Flood Insurance Program (NFIP) accuracy requirements.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were taken from the City of Springfield Flood Insurance Study (Reference 1).

1.3 Coordination

On June 21, 1982, the results of this study were reviewed and accepted at a final coordination meeting attended by representatives of the community and FEMA.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Leland Grove, Sangamon County, Illinois. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected based upon the extent and validity of available existing hydrologic and hydraulic data. The scope and methods of study were proposed to and agreed upon by FEMA and the City of Leland Grove.

Jacksonville Branch and Jacksonville Branch Tributary were studied by detailed methods within the corporate limits.

2.2 Community Description

The City of Leland Grove is located in central Illinois, in the center of Sangamon County. The Village of Jerome borders the south side of the city. The City of Springfield surrounds Leland Grove in all other directions except the northwest corner. The northwest corner is bordered by unincorporated areas of Sangamon County. The population in 1981 was 1,692 (Reference 2).

The climate of the area is humid continental, characterized by cold, relatively dry winters and warm to hot, wet summers. The highest temperature ever recorded in the area is 112 degrees Fahrenheit (F.), the lowest is -24 degrees F. The average maximum and minimum temperatures for the period of 1945 to 1980 at Leland Grove, are 77.3 degrees F. and 27.3 degrees F., respectively. The average annual rainfall at Leland Grove for the same period is 35 inches. The average annual snowfall is 19 inches. The average growing season in the area is 187 days (Reference 3).

The soil types found within the flood plain of Jacksonville Branch and its tributary is a silt loam with similar characteristics to the silty clay loam. This soil type is mostly level and poorly drained with slow surface runoff (Reference 4).

The flood plain of Jacksonville Branch and its tributary has been subjected to residential and commercial development for the last 20 years.

2.3 Principal Flood Problems

The history of flooding on streams in the area indicates that flooding of significance has occurred generally between the months of February and July. It is reasonable to anticipate that a major flood could occur during any season of the year, as a result of severe isolated thunderstorms and/or snowmelt. The probability of major floods occurring would be higher for the months of March, April, and May, due to possibilities of simultaneous snowmelt and extended recurring storm periods. There are no records of historical floods on Jacksonville Branch or its tributary.

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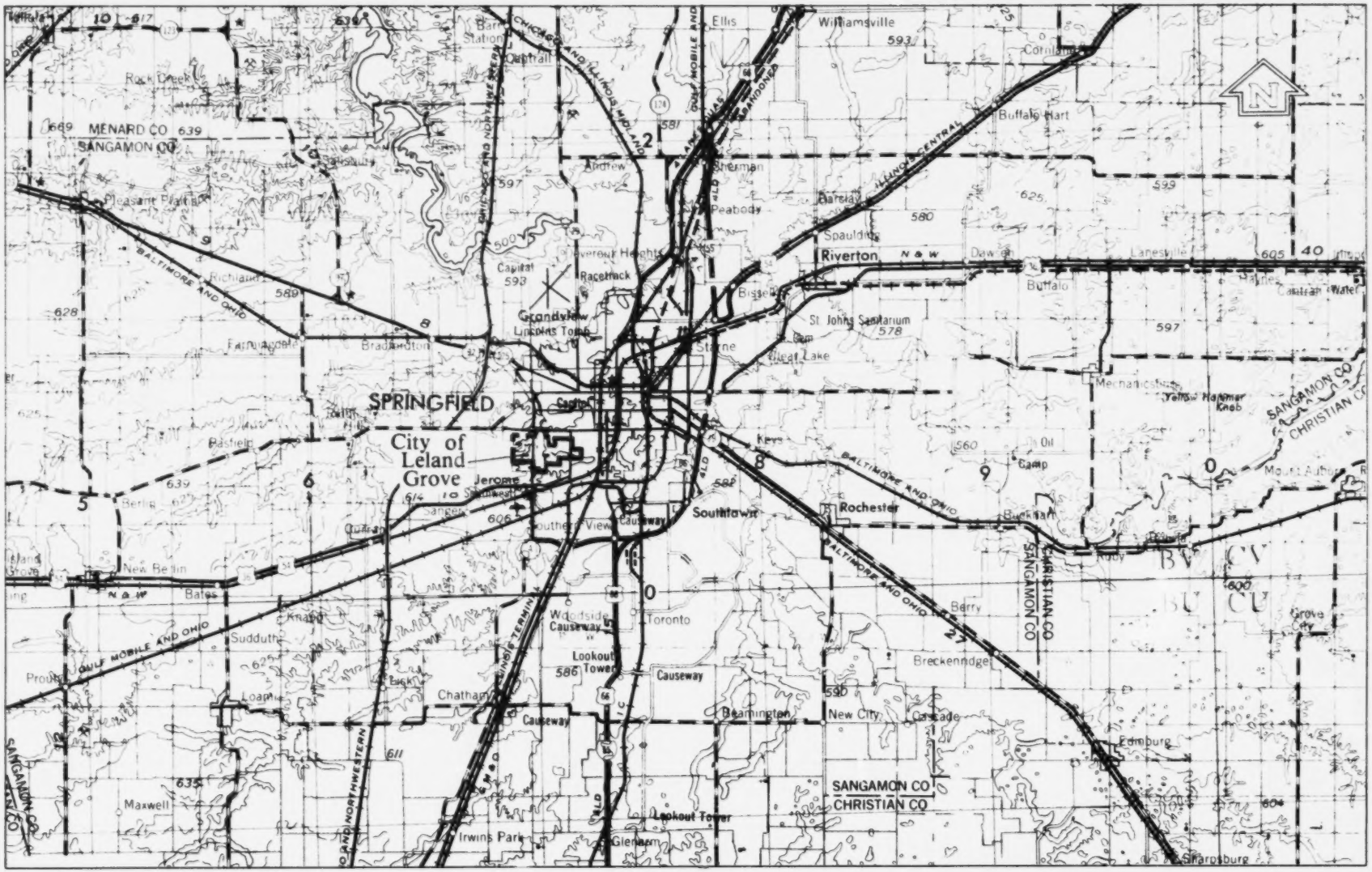

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LELAND GROVE, IL
(SANGAMON CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

2.4 Flood Protection Measures

No flood control measures exist on Jacksonville Branch or its tributary.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100- and 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100- and 500-year floods, have a 10-, 2-, 1- and 0.2 per cent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one per cent chance of annual occurrence) in any 50-year period is about 40 per cent (four in ten), and for any 90-year period, the risk increases to about 60 per cent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

The U.S. Geological Survey (USGS) "Technique for Estimating Magnitude and Frequency of Floods in Illinois" (Reference 5), was used as prescribed by the Division of Water Resources, to determine discharges. This method utilizes the drainage area, slope, rainfall intensity and areal adjustment factor of the watershed.

Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
JACKSONVILLE BRANCH					
Upstream of confluence of Jacksonville Branch Tributary	5.2	990	1,380	1,520	1,880
JACKSONVILLE BRANCH TRIBUTARY					
At mouth	1.6	610	730	790	910

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams in the community were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals along each flooding source studied in detail.

Channel and part of the overbank cross section data for streams in the area were obtained by field survey. The rest of the overbank data was taken from USGS quadrangle maps at a scale of 1:24000 with 10-foot contour intervals (Reference 6). All bridges, dams, culverts and levees were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map.

Channel and overbank roughness factors (Manning's "n") were assigned reflecting engineering judgment based on field observations and photographs taken by field crews. Jacksonville Branch and Jacksonville Branch Tributary used values of 0.030 or 0.035 for the channel. Overbank roughness values generally appeared to range between 0.060 and 0.080.

Starting water-surface elevations were based on engineering judgment that flood levels in the receiving stream and the tributary stream do not occur simultaneously; therefore, lower elevations of lesser floods on parent streams were selected for starting water-surface elevation on tributaries.

Water-surface profiles were computed through the use of the U.S. Army Corps of Engineers (COE) HEC-2 computer program (Reference 7).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are, therefore, considered valid only if hydraulic structures, in general, remain unobstructed and if channel and overbank conditions remain essentially the same as ascertained during this study.

All elevations are referenced from National Geodetic Vertical Datum of 1929 (NGVD); elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by FEMA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100-year and the 500-year floods have been delineated using the elevations determined at each cross section; between cross sections the boundaries were interpolated using topographic maps enlarged to a scale of 1:12000 with a contour interval of 10 feet (Reference 6).

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map. Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to lack of detailed topographical information or to limitations of the map scale, such areas are not shown. In cases where the 100-year and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. In the case of the State of Illinois, a more stringent criteria of "no signficant increases"

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in flood height has been adopted (Reference 8). This has generally been interpreted as "not more than 0.1-foot increase"; therefore, the maximum increase of 0.1 foot has been utilized in this study.

The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2). Portions of the floodway for Jacksonville Branch Tributary lie outside the corporate limits.

As shown on the Flood Boundary and Floodway Map, the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 0.1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

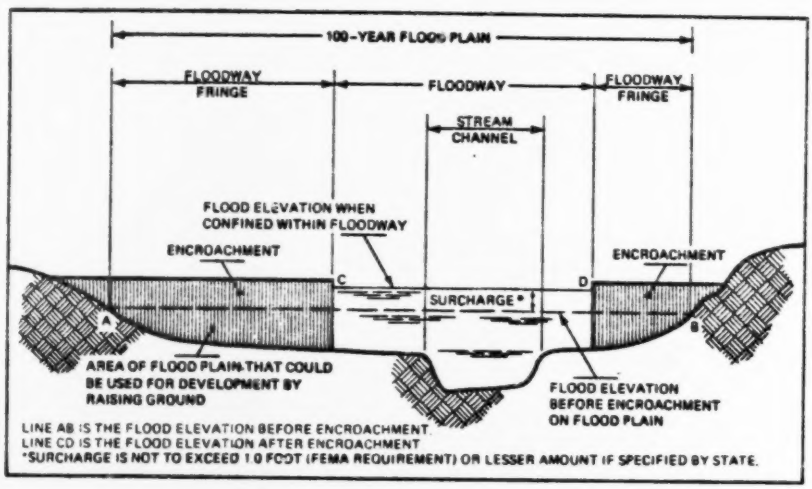
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 2 - Floodway Schematic

The floodways in this report are recommended to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, FEMA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHF), and flood insurance zone designations for each flooding source affecting the City of Leland Grove.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE
JACKSONVILLE BRANCH							
A	16,348	235	449	4.9	564.6	564.6	0.0
B	17,016	215	797	2.7	566.6	566.6	0.0
C	17,754	224	557	3.9	567.5	567.5	0.0
JACKSONVILLE BRANCH TRIBUTARY							
A	1180	104[2]	369	2.1	573.6	573.5	0.1

[1]FEET ABOVE MOUTH
[2]THIS WIDTH IS BEYOND CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LELAND GROVE, IL

(SANGAMON CO.)

FLOODWAY DATA

JACKSONVILLE BRANCH - JACKSONVILLE BRANCH TRIBUTARY

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5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 per cent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the City of Leland Grove are shown on the Flood Profiles and are summarized in Table 3, "Flood Insurance Zone Data."

5.2 Flood Hazard Factors

The FHF is used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the City of Leland Grove was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zones A1, A3: Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations are shown, and zones subdivided according to FHF.

Zone B: Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Leland Grove is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by FEMA.

6.0 OTHER STUDIES

This Flood Insurance Study was prepared by compiling existing hydrologic and hydraulic technical and scientific data prepared by other organization(s) originally for purposes other than the NFIP. The data was identified as the best available at the time of compilation of this FIS and should depict the general conditions of the flooding sources with relative accuracy. FEMA performed a cursory review and accepted the data as valid for purposes of this FIS and the NFIP. However, if better information is known to exist or has been developed since the date of this report, the information should be immediately forwarded to the Natural and Technological Hazards Division, Federal Emergency Management Agency, Chicago, Illinois for consideration for revision of this study.

Flood Insurance Studies have been completed for the City of Springfield and the Unincorporated Areas of Sangamon County (References 1 and 9) which are in agreement with this study.

A Flood Hazard Boundary Map has been published for the community (Reference 10). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study.

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the National Flood Insurance Program.

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FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
JACKSONVILLE BRANCH							
REACH 1	0001	–1.4	–0.3	1.3	015	A3	VARIES–SEE MAP
JACKSONVILLE BRANCH TRIBUTARY							
REACH 1	0001	–0.6	–0.2	0.3	005	A1	VARIES–SEE MAP

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LELAND GROVE, IL

(SANGAMON CO.)

FLOOD INSURANCE ZONE DATA

JACKSONVILLE BRANCH - JACKSONVILLE BRANCH TRIBUTARY

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 300 South Wacker Drive, (24th Floor), Chicago, Illinois 60606.

8.0 REFERENCES AND BIBLIOGRAPHY

1. Federal Emergency Management Agency, Flood Insurance Study, City of Springfield, Illinois, February 1982.

2. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Illinois, Washington, D.C., 1982.

3. Sangamon County Regional Planning Commission, Environmental Facts, Springfield and Sangamon County, Illinois, June 1975.

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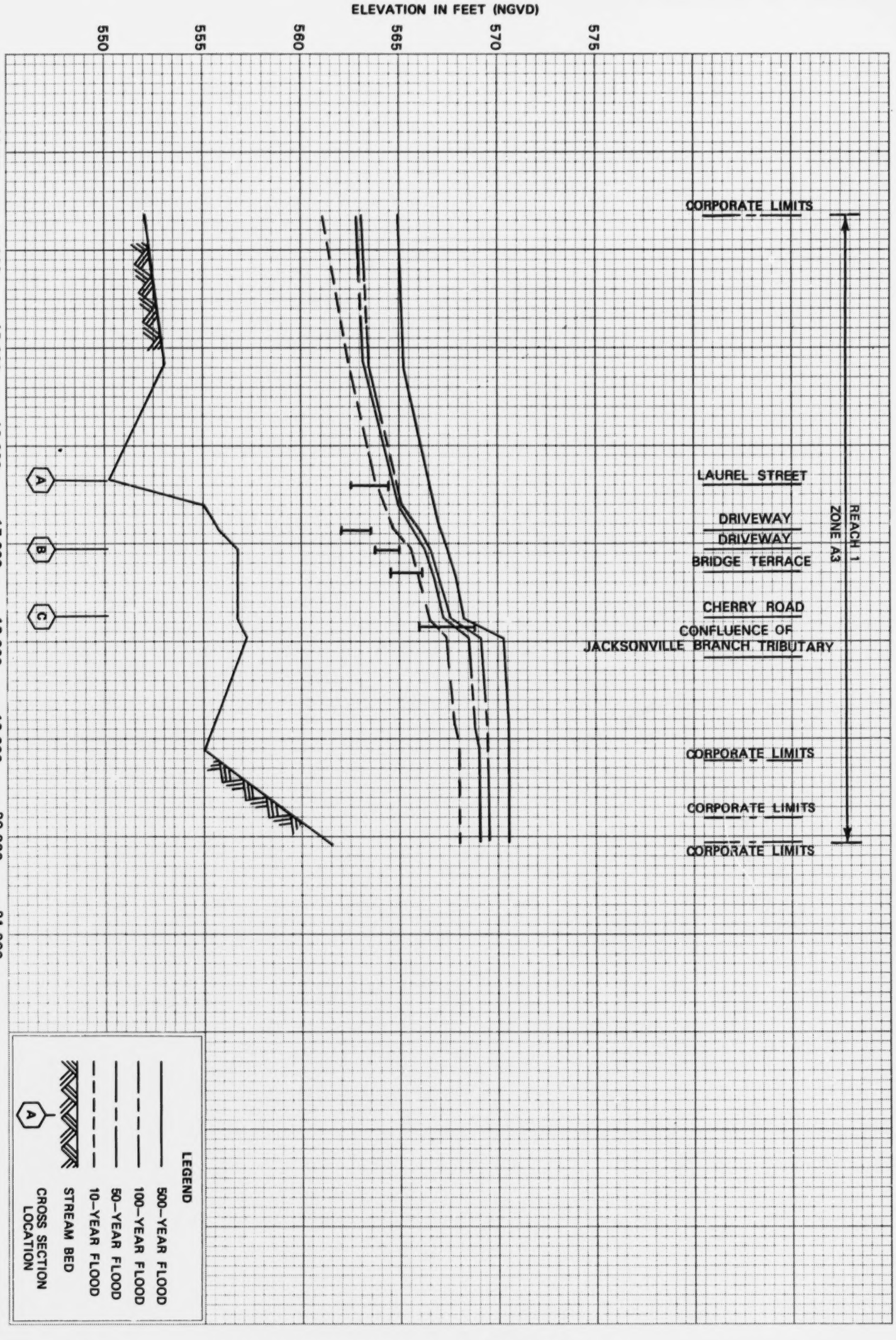
9. Federal Emergency Management Agency, Flood Insurance Study, Unincorporated Areas of Sangamon County, Illinois, (in progress).

10. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, City of Leland Grove, Illinois, April 1978.



01P	FEDERAL EMERGENCY MANAGEMENT AGENCY **CITY OF LELAND GROVE, IL** (SANGAMON CO.)	**FLOOD PROFILES** **JACKSONVILLE BRANCH**

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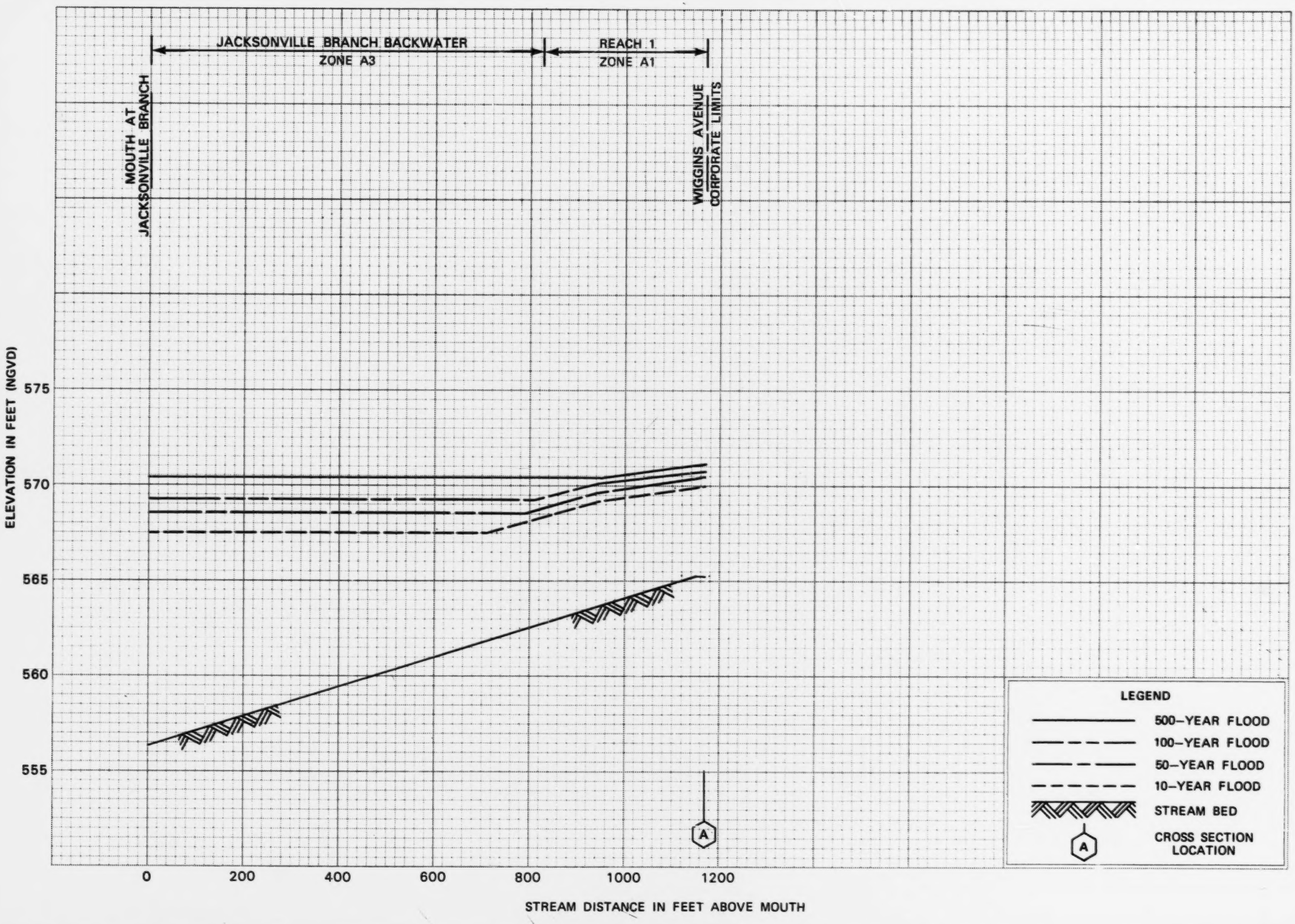

FLOOD PROFILES

JACKSONVILLE BRANCH TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LELAND GROVE, IL
(SANGAMON CO.)

02P

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